A REVIEW OF FIFTEEN HUNDRED OPERATIONS UPON THE GALL-BLADDER AND BILE PASSAGES WITH ESPECIAL REFERENCE TO THE MORTALITY.[1]

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Between June 24, 1891, and May 1, 1906, Dr. Charles H. Mayo and myself have performed 1500 operations upon the gall-bladder and bile passages, of which number 96 per cent. were operated upon in St. Mary's Hospital, Rochester, Minnesota, and under nearly identical conditions.

One thousand of these cases were commented upon in a paper read before the Southern Surgical and Gynecological Association in December, 1904, and will be found in the Transactions of the society for that year.

The three most important considerations in the surgical treatment of any disease are, first, the mortality; second, the permanence of cure; third, the disability arising from the operation itself. The following investigation has been conducted with a view of elucidating the truth in regard to these essentials.

Mortality.—The first question to be considered concerns the operative mortality. In the 1500 operations there were 66 deaths, 4.43 per cent. In the first 1000 cases, previously referred to, the death rate was 5 per cent.; in the last 500, since that time, 3.2 per cent. This includes acute perforations with septic peritonitis and malignant disease. These statistics give, as an operative death, every case dying in the hospital without regard to the length of time thereafter. It includes death from accidental causes such as pulmonary embolus, myocarditis and a number of cases dying from chronic conditions occurring after one month, one from chronic nephritis as long as ten weeks after operation. This works an injustice to the statistics but eliminates the personal equation.

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[1] Read before the American Surgical Association, June 1, 1906.

There were 845 cholecystostomies with a mortality of 2.13 per cent. In the last series of 500 there were 272 cholecystostomies with a mortality of 1.47 per cent. Two of these were sudden deaths from pulmonary embolism.

Looked at from the standpoint of mortality, cholecystostomy is the safest for the average case and must be considered the normal operation. As we had but one case of our own in the entire series of 1500 operations in which gall-stones reformed in the gall-bladder, this cannot be taken as a valid objection to leaving it *in situ*.

There are some conditions in which, after cholecystostomy, future trouble may be expected. First, in all those cases in which the cystic duct is obstructed by a stone, and the gall-bladder takes no part in the biliary circulation (contains no bile), other things being equal, it should be removed, as in this condition we have occasionally had to remove it secondarily for the relief of mucous fistula or colics due to obstructions, to drainage from kinking or stricture. Second, thick-walled gall-bladders which have become functionless, lead to a suspicion of malignant disease and should be excised. We have in this way several times unexpectedly removed what proved to be an early carcinoma of the gall-bladder. One such patient is now alive, more than three years.

In connection with common-duct surgery it is not wise to remove a functionating gall-bladder unless for direct indication. This is particularly true if cholangitis exists, as common-duct cases more often require a secondary operation than any other, and the gall-bladder not only affords easy drainage and enables cholecystenterostomy should there be future contraction and obstruction of the common duct, but it is also a safe guide to the deep ducts if future trouble should arise.

As to permanency of cure, our cholecystostomies have remained well with the exception of a few instances of bad selection in our early experience in which cholecystectomy would have been the better operation.

The operative disability after cholecystostomy was brief. A short incision with separation of the fibres of the rectus muscle rendered early union without hernia almost a certainty. By turning in the cut margins of the gall-bladder about the tube (Summers) in a similar manner to the Stamm-Kader gastrostomy, the bile discharge stopped promptly as, on removal of the tube at the end of the week, the peritoneal surfaces agglutinated. The average patient was up in twelve days and left the hospital within two weeks.

CHOLECYSTECTOMY.

There was a total of 319 cholecystectomies, with a mortality of 3.13 per cent. In the cholecystectomies in the last series of 500 cases the mortality was 1.62 per cent.

Cholecystectomy has an increasing field of usefulness, but its increase of mortality, which, although slight, is for one reason or another fairly certain, prevents it from replacing cholecystostomy. At the same time, where the circumstances permit of easy removal of the gall-bladder and the disease is confined entirely to this organ, it is the operation we most commonly perform even in cases in which cholecystostomy would answer the purpose. But if the patient is very obese and the gall-bladder has a broad attachment to the liver necessitating prolongation of the incision or increased manipulation, cholecystectomy is the more difficult and dangerous operation.

The permanence of cure after cholecystectomy is of course absolute when the disease is confined to the gall-bladder. In the majority of cases the incision was made nearly if not quite as short as for cholecystostomy. The period of convalescence was therefore about the same. In a few cases a longer incision was required, adding several days to the disability. It was very rare that a patient was in the hospital more than fourteen days.

OPERATIONS UPON THE COMMON DUCT—207 CASES.

Operations upon the common duct so far as the mortality is concerned can be divided into four groups. This arrangement is more or less artificial, as some cases are hard to classify.

Group 1. One hundred and five cases with 3 deaths, 2.9 per cent., consisting of those patients in whom gall-stones were present in the common duct but without immediately active symptoms. Jaundice was moderate or not present. If it was present the obstruction was incomplete or intermittent and permitted of the escape of a certain amount of bile into the intestine. There was comparatively little infection of the ducts and with the exception of the presence of mucus, the bile was normal. The operation under such circumstances was simple and the convalescence short, the patients usually being able to leave the hospital within 15 days, and the cure has been permanent.

Group 2. Sixty-one cases with 10 deaths, 16 per cent. A series of cases in which there was active infection not only in the common duct but also involving the ducts of the liver. Stones were usually present. The patient not only had jaundice but suffered from Charcot's fever, (malarial type, irregular chills followed by a temperature from 103° to 107°, passing off in a few hours with sweating), pain intermittent and most marked just previous to the active symptoms; during the remissions a little bile passed the obstruction, relieving the liver. Among the older writers this was called "Remittent Bilious Fever." The added infection at once introduced an element of grave danger, not only from the operation itself but also through the production of certain complications which caused death in the first two months.

The patient also had an increased possibility of future trouble as it was in this group that hepatic-duct stones were formed, of which we have seen seven examples. The infection and interference with drainage from a stone formed in the gall-bladder but which had passed into and lodged in the common duct furnished the necessary conditions for their formation. The cholangitis may subside and the stones reach a more or less quiescent state but after removing the calculi from the common duct others which have formed in the hepatic ducts may pass into the common duct, causing future trouble.

Coincident enlargements in the head of the pancreas or changes in the duct-wall may lead to secondary stone formation. Under such circumstances we have four times seen stones reform in the common duct after periods of from one to five years, requiring second operations. In two the gall-bladder had been removed at the primary operation, and the stones were too large to have come down from the hepatic-ducts. The possibility that these stones had as their nuclei hepatic-duct calculi cannot be denied in one case, but it does not seem possible that this was the fact in the other three. It was this group that was so often found associated with inflammatory diseases of the pancreas.

As a rule these patients were in the hospital from three to four weeks.

Group 3. Complete obstruction of the common duct; 29 cases and 10 deaths; 34 per cent. It is hardly necessary to call attention to the fact that formation of bile is only one of the functions of the liver, and that a patient may live for a great length of time with nearly if not quite complete obstruction of the common duct, the necessary amount of bile being absorbed by the blood and eliminated with the urine, perspiration, etc. In Group 1 we found the bile comparatively healthy, containing only a moderate amount of mucus. In Group 2 the bile was darker, containing a large amount of mucus and often showing colon bacillus on culture. The third group showed almost no bile in the ducts and the little present was thin and of a dark spinach-green color, or in the worst cases a condition of complete acholia was manifest, the ducts being filled with a clear, colorless, mucoid secretion. The patient's general condition was extremely poor, pulse feeble and rapid, and in the long-standing cases there was sometimes œdema of the feet and free, bile-stained fluid in the peritoneal cavity. Albumen and casts in the urine and other evidences of extreme toxemia were usually manifested.

The operative mortality in this group during the period of complete obstruction was very high, 34 per cent. including deaths from early and late complications. Acute obstructions of this type when accompanied by evidences of infection were especially fatal, and as acute obstruction from stone is seldom permanent, it is often wise to wait for a period of remission before operation. It seldom happens that the duct will not dilate sufficiently in the early stages to permit of some relief of the symptoms, and this is the time to interfere, although later the inflammatory products in the duct-wall may contract down upon the stone, giving rise to permanent obstruction. In a few instances of complete obstruction which came on suddenly and which remained without temporary remission of symptoms, spontaneous cure by sloughing of the stone into the intestine took place. We have seen four examples. In each, after years of typical gall-stone symptoms, there was sudden and complete obstructive jaundice. In two there was a steady temperature and in all four there was a peculiar rigidity of the upper abdomen. After from six to twelve weeks of acute and severe symptoms the patient suddenly became relieved, the jaundice disappeared and a large gall-stone was found in the stool. Three of these patients were subjected to operation subsequently. In all one or more stones were found in the gall-bladder or in the adjacent liver border, the center of a cicatricial mass, but without communication with the bile tract, the common duct being densely adherent to the duodenum at the site of perforation.

The most common causes of death after operation in this group have been exhaustion from cholemia, with or without capillary hæmorrhage, and from sudden cessation of liver function.

All of the patients who recovered remained well. The hospital disability averaged a little over three weeks.

Group 4. This group concerned malignant disease; 12 cases; 4 deaths; 33⅓ per cent. mortality. Cancer of or involving the common duct occurs in two forms. First the primary tumor of the common duct or papillæ, a small, hard, grayish-white mass, with a tendency to remain localized until a late stage. We have seen several examples and have had two primarily successful excisions, but no case which has lived beyond three years. Second, common-duct obstructions from carcinoma extending downward from the gall-bladder and cystic duct, or from cancer of the head of the pancreas. These cases are of course inoperable, and even an exploration proved fatal in several instances.

RELATION TO PANCREATITIS.

One of the most interesting problems in connection with surgery of the bile tract concerns coincident inflammations of the pancreas. In a total of 86 out of the 1500 cases the pancreas was involved to such an extent as to be noticeable on examination. Four of these cases were acute, of which two recovered and two died. Six were subacute, two of these having hæmorrhagic cysts; five recovered and one died; 9 cancer, 5 deaths; 67 had chronic pancreatitis; the evidences usually consisted of hard nodules most marked in the head of the pancreas and near to the common duct. Four cases, supposed to be common-duct obstruction from chronic pancreatitis alone, were shown by subsequent operation to have had an undiscovered stone in the ampulla. In a few cases the pancreatic disease apparently was not secondary to the bile tract.

That the acute forms have had a deleterious effect upon the patient is unquestioned but I have been unable to separate the harm done by the chronic inflammations from the essential condition in the bile tract and I do not believe that unless it was obstructive it had a decided influence on the prognosis.

In summing up the causes of the 66 deaths 10 or 15 per cent. were accidental and could be eliminated. The largest number were due to cessation of liver function, usually the result of infections, microscopical examination showing destruction of the epithelial elements of the liver and often fatty degeneration. Next came exhaustion from blood changes due to chronic cholemia.

It was the mortality and complications of delay that placed the early operation for appendicitis on a sound surgical footing. To remove the disease while still in the appendix and before its rupture involved the abdominal cavity, was the logical conclusion.

The same reasons apply and with equal force to the early operation for gall-stone disease. Remove the disease while still in the gall-bladder by a mortality of from 1.47 per cent. (cholecystostomy) to 1.62 per cent. (cholecystectomy). This includes death from accidental causes, acute perforation and gross infections. Excluding these cases a mortality of less than 1 per cent. can be shown.

With the passage of the stone into the common duct we no longer have a localized disease but one fraught with grave dangers from liver infection and cholemia, and in this condition nearly one in seven of our cases came to operation, while one in twenty-five developed malignant disease of the gall-bladder, or bile tract, and in most of these cases gall-stones were present. In other words, one patient in six had allowed the favorable time to go by, although the very large majority had ample warning in the early and safe stage for operation.